

This listing of claims will replace the originally filed claims in the application.

Listing of Claims

Claims 1 – 10 (canceled).

Claim 11 (new): An apparatus for cutting a metal workpiece, comprising:

- a) a dual-gas-flow torch;
- b) said torch comprising an electrode with an emissive insert;
- c) said torch comprising a gas delivery system;
- d) said gas delivery system comprising a central gas stream and an annular gas stream; and
- e) said annular stream being delivered peripherally to said central gas stream, wherein said central gas stream contains a hydrogen-nitrogen mixture and said peripheral gas stream contains carbon dioxide.

Claim 12 (new): The apparatus according to claim 11, wherein said peripheral gas stream contains at least about 50% carbon dioxide, by volume.

Claim 13 (new): The apparatus according to claim 12, wherein said peripheral gas stream contains at least about 80% to about 100% carbon dioxide, by volume.

Claim 14 (new): The apparatus according to claim 11, wherein said central gas stream contains between about 1.5% and about 60% hydrogen, by volume.

Claim 15 (new): The apparatus according to claim 14, wherein said central gas stream contains between about 4% and about 10% hydrogen, by volume.

Claim 16 (new): The apparatus according to claim 11, wherein said central gas stream contains between about 1.5% and 60% hydrogen by volume, and nitrogen for the balance.

Claim 17 (new): The apparatus according to claim 11, wherein said emissive insert comprises tungsten or an alloy containing predominantly tungsten.

Claim 18 (new): The apparatus according to claim 11, wherein said electrode comprises copper or a copper alloy.

Claim 19 (new): The apparatus according to claim 18, wherein said electrode comprises copper-tellurium alloy or copper-chromium-zirconium alloy.

Claim 20 (new): The apparatus according to claim 11, further comprising a workpiece to be cut.

Claim 21 (new): The apparatus according to claim 20, wherein said workpiece to be cut comprises structural steel, stainless steel, or an aluminum alloy.

Claim 22 (new): The apparatus according to claim 21, wherein said workpiece to be cut comprises structural steel.

Claim 23 (new): A method of cutting a metal workpiece, comprising:

- a) providing a workpiece to be cut;
- b) providing a dual-gas-flow torch, said torch further comprising a first nozzle and a second nozzle, an electrode with an emissive insert, and a gas delivery system, said gas delivery system further comprising a central gas stream and an annular gas stream, said annular stream being delivered peripherally to said central gas stream, wherein said central gas stream contains a hydrogen-nitrogen mixture and said peripheral gas stream contains carbon dioxide;
- c) introducing a first gas stream between said first nozzle and said electrode so as to obtain said central gas stream;
- d) generating an electric arc on said electrode with said emissive insert;
- e) introducing a second gas stream between said second nozzle and said first nozzle so as to obtain said annular gas stream;
- f) delivering said central gas stream and said annular gas stream to the surface of said workpiece, in the form of a plasma arc jet containing said central and annular gas streams, and said electric arc; and
- g) cutting said workpiece by means of said plasma arc jet.

Claim 24 (new): The method according to claim 23, wherein step e) is performed prior to step d).

Claim 25 (new): The method according to claim 23, wherein step e) is performed subsequent to step d).

Claim 26 (new): The method according to claim 23, wherein the flow rate and the pressure of said central gas stream, and the flowrate and the pressure of said peripheral annular gas stream are adjusted according to the thickness of said workpiece.

Claim 27 (new): A plasma cutting unit comprising:

- a) a dual-gas-flow torch, said torch comprising an electrode with an emissive insert, a first nozzle placed around said electrode, forming a plasma chamber with said electrode, a second nozzle placed coaxially with said first nozzle and forming an internozzle space with said first nozzle;
- b) a first gas source containing a hydrogen-nitrogen mixture in fluid communication with said plasma chamber, supplying said plasma chamber with said hydrogen-nitrogen; and
- c) a second gas source containing carbon dioxide in fluid communication with said internozzle space, supplying said internozzle space with said gaseous carbon dioxide.